

CIO Preferred Technologies for Geographic Information Systems (GIS)

This document outlines the preferred technologies for Geographic Information Systems (GIS) technologies and products in the County of Los Angeles. Developing preferred standards will support the Chief Information Office's mission of reducing redundant development platforms and streamlining the management and maintenance of GIS data and applications.

Overview

Geographic Information Systems preferred technologies are broadly divided into the following tiers:

- GIS Data Management Tier
- GIS Data Storage Tier, including database and enabling technologies
- GIS Data Deployment and Communication Protocol Tier
- GIS Application Development Tier

Tier	Preferred Technologies	Source of Standard	Alternate(s)	Emerging Technologies
Data Development	ESRI ArcGIS Desktop	De-facto	MapInfo GeoMedia (Intergraph)	QGIS, gvSIG, GRASS GIS, Window GIS, MapGuide
Data Storage	SQLServer with ESRI SDE Oracle with ESRI SDE	County Preferred Technologies	SQL Server Spatial Oracle Spatial	PostgreSQL (PostGIS)
GIS Data Deployment	ESRI ArcGIS Server	De-facto		GeoServer, OpenGEO, MapServer
GIS Communication	ESRI REST API	De-facto	SVG	
	SOAP	W3C		
	WFS (Web Feature Service)	OGC (Open Geospatial Consortium)		
	WMS (Web Mapping Service)	OGC (Open Geospatial Consortium)		
GIS Application Development	Latitude Geographics Geocortex Products	CIO Identified	Orion	Open Layers, MapBox, MapFish, GeoCommons, MoosePointTechnology, GeoNorth
	ESRI Application Development			
	Custom coding			
Mobile Application Development	TBD	TBD	TBD	Phonegap
Alternate Map sources	Google Maps		OpenStreetMap	TileMill
	Bing Maps			

GIS Data Management Tier

ESRI's ArcGIS series of software (ArcGIS Desktop Basic, Standard, and Advanced) is the de-facto standard for the development and maintenance of GIS data, with 98% of the installed desktop GIS software base. GIS professionals also use this software to do advanced geographic analysis, complete mapping tasks, and provide support to County department business operations.

Continuing updates from the software vendor (esri) ensures that this software is kept up to date.

Emerging Technologies

Open source desktop GIS software packages are becoming increasingly viable. Quantum GIS (QGIS) is an actively supported open source software that supports local data management, mapping, and analysis, but without some of the advanced analysis and central data management capabilities supported by ESRI's software. QGIS integrates with GRASS GIS, a historical desktop software product. QGIS and other software like it should continue to be evaluated, since the open source (free) model may provide cost savings. However, retraining staff to use this tool would be a substantial expense.

GIS Data Storage Tier

Microsoft SQL Server and Oracle database technologies are County Preferred technologies, and support enterprise level access to data, both geographic and non-geographic.

Historically GIS data has been stored in these databases using a proprietary format from ESRI called SDE binary. Recently, ESRI's desktop software is able to leverage the native spatial types that are now part of the two databases (SQL Spatial and Oracle Spatial). This enables applications to leverage database queries directly, potentially increasing performance. It is recommended that data be stored in the native spatial formats rather than the SDE binary format.

Emerging Technologies

An open-source database (PostgreSQL) has become a strong spatial database storage technology. With its spatial format enabled, it is called PostGIS, and is supported by ESRI's desktop and server technologies. While this database is not currently a County Preferred Technology, as the open source model becomes more attractive to the County, this database technology may warrant further investigation as a means of cost savings, since there are no licensing fees. Costs to transition data and staff expertise limit the benefits of the software cost savings, however.

GIS Data Deployment and Communication Protocol Tier

Along with the Desktop and Storage tiers, ESRI's ArcGIS Server software is the de-facto standard for deploying data for application development and data deployment. ArcGIS Server enables data to be provided to the application tier through the following methods:

- REST – lightweight communication protocol using JSON to enable
- SOAP
- WFS (Web Feature Service) - which streams information to the client
- WMS (Web Mapping Service) – where the server processes the data into a map and sends the resulting image to the client.

Emerging Technologies

A number of new data deployment software options have become available, including Map Server and GeoServer, which are open source software tools for publishing data. Boundless (formerly OpenGeo) provides a full stack of software components including PostGIS and GeoServer with support options.

GIS Application Development Tier

As GIS server technologies were adopted, County departments identified the need for a GIS Application Development Framework. This framework would enable GIS applications to be developed through a standard configuration tool rather than custom coding.

Deploying such a tool would:

- Reduce development costs;

- Increasing development speed;
- Reduce application maintenance costs;
- Reduce application upgrade costs;
- Support code-sharing and re-use;
- “Future-proof” applications as underlying technologies from ESRI were upgraded,
- Add new functionality as the framework was upgraded.

Geocortex IMF

In 2005, the Department of Regional Planning compared available off the shelf solutions, and identified Geocortex IMF from Latitude Geographics as the solution best suited to deploy applications based upon ESRI’s Server technology (ArcIMS). Latitude Geographic was selected because it offered:

- The best integration with ESRI’s Server technology (ArcIMS);
- The simplest configuration framework;
- The most comprehensive set of GIS tools (features and functions)
- The widest set of configuration options;
- Clearest technology upgrade path;
- Best pricing.

Regional Planning developed a number of applications using Geocortex IMF, including GIS-NET, Z-NET, SUB-NET, and OV-NET. In 2007, the enterprise GIS Committee reviewed available software and expanded scope of this software to an enterprise-wide application framework. An ITF grant funded a Countywide license and the development of seven department specific GIS applications, including DPSS, DHS, Parks, CDC, Probation, Library, Public Health, and the development of a Countywide Property Search System.

Geocortex Essentials

As ESRI migrated from ArcIMS to ArcGIS Server, Latitude Geographics migrated to Geocortex Essentials, which provided the same framework for ArcGIS Server as their IMF product did for ArcIMS. Geocortex Essentials has continued to be used as the County’s preferred Application Development Framework because it:

- Is a product with regular development cycles rather than un-supported code;
- continues to have tight integration with ESRI’s ArcGIS server technology;

- supports new releases of ESRI ArcGIS Server technology;
- includes technical support and training;
- provides the ability to share code between applications;
- receives regular upgrades and addition of new features and functions as part of the product;
- supports for new and emerging platforms including mobile devices;
- supports for new operating systems and standards, including iOS, Android, and HTML5;

The following departments are currently deploying applications using Latitude's Essentials Products:

1. Regional Planning
2. Public Works
3. LA County ISD
4. Public Health
5. Parks
6. CEO

Alternate Map Sources

A number of commercial map sources exist. The most commonly used are Google Maps and Bing Maps, since these are highly available, updated, and commonly used base maps that provide worldwide coverage, which support user access to maps outside of the boundaries of LA County. Bing Maps is more commonly supported within the existing ESRI-based ArcGIS Server software, and is easily added as part of the Latitude Geographic suite of application development tools. Google maps is commonly used for stand-alone application development like the County Services Locator (<http://maps.lacounty.gov>)